# ORDER

6850.31

REMOTE RADIO CONTROL SYSTEM
FA-10266
PROJECT IMPLEMENTATION PLAN

April 30, 1990

# DEPARTMENT OF TRANSPORTATION
## FEDERAL AVIATION ADMINISTRATION

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Initiated By: ANN-140

# RECORD OF CHANGES

**DIRECTIVE NO.** 6850.31

| CHANGE TO BASIC | SUPPLEMENTS | | | OPTIONAL USE | CHANGE TO BASIC | SUPPLEMENTS | | | OPTIONAL USE |
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GPO 1968 O- 308-181

# FOREWORD

This project implementation plan (PIP) provides management direction for the implementation and acceptance of the Remote Radio Control System (RRCS) into the National Airspace System (NAS). It defines the major functional responsibility levels, management direction, and overall program guidance to all responsible levels within the Federal Aviation Administration (FAA) for the procurement and implementation of the RRCS.

for Rodman B. Gill
Program Director, Navigation and Landing

TABLE OF CONTENTS

Page No.

# CHAPTER 1. GENERAL

1. **PURPOSE.** This project implementation plan (PIP) provides technical guidance and management direction for the implementation of the Remote Radio Control System (RRCS). The PIP establishes program management, project implementation policy, and responsibilities governing the activities of organizations. The PIP is organized and presented as per FAA-STD-036, Preparation of Project Implementation Plans.

2. **DISTRIBUTION.** This order is distributed to branch level to the Program Directors for Communications, Navigation and Landing, and Weather and Flight Service Systems; the NAS System Engineering, Systems Maintenance, and Logistics Services; Aviation Standards National Field Office, Office of Airport Standards; to division level in the Flight Standards Service, and Air Traffic Plans and Requirements; to branch level in the regional Airway Facilities, Airports, Air Traffic, and Flight Standards divisions; to the Director, FAA Technical Center, to branch level in the FAA Depot and FAA Academy at the Mike Monroney Aeronautical Center; and limited distribution to the Airway Facilities General National Airspace System (NAS) sectors, sector field offices, sector field units, and sector field office units.

3. **AUTHORITY TO CHANGE THIS ORDER.** The Program Director, Navigation and Landing (ANN) shall approve all changes to this order.

4.-19. RESERVED.

## CHAPTER 2. PROJECT OVERVIEW

**20. SYNOPSIS.** As a result of the FAA's examination of the present visual guidance lighting system, the FAA found it necessary to undergo a multiyear program to provide safety related facilities and enhancements to visual guidance lighting systems. The visual guidance lighting program includes the replacement or establishment of remote radio controls for visual aids to meet the operational requirements of air traffic controllers and remove complex coding requirements. The RRCS will permit single-button control of each visual aid function.

**21. PURPOSE.** The purpose of the RRCS is to provide independent operation and control from the air traffic control tower (ATCT), Automated Flight Service Station (AFSS) or Flight Service Station (FSS) for FAA installed visual aid systems. The RRCS program supports an FAA effort to reduce the expense of installing new cabling from lighting systems to the ATCT; to standardize and reduce the cost of equipment maintenance; and to provide a system that improves the man-machine interface between the controller and the lighting equipment.

**22. HISTORY.**

a. During the late 1960's and early 1970's, most visual aid systems were indirectly controlled by photoelectric devices and/or by sensing the runway edge lighting circuit. It was determined in July 1975 that control of some visual aids must be established at the ATCT. Presently, some visual aid lighting system equipments are linked to FAA ATCT facilities by remote radio control. In 1975, however, a number of visual aids had no remote control from the ATCT. With the FAA determination that remote control of certain visual aids was required, a program was implemented to install Motorola 504 RRCS's for all medium-intensity approach lighting systems with runway alignment indicator lights (MALSR); other visual aids were also allowed to be remote controlled as justified by the regions on a site-by-site determination. In 1980, Motorola ceased manufacturing the 504 RRCS and for a relatively brief period of time the air traffic controllers insisted on the purchase of additional units by submitting many unsatisfactory condition reports. The FAA responded by developing a new procurement specification for purchasing additional RRCS's. The new specification FAA-E-2723, Remote Radio Control System, allows for competitive procurement and meets air traffic controller requirements.

b. The specification FAA-E-2723 was baselined and the project budgeted under specific visual aid facilities and set aside for an 8A contractor. Sonicraft, Inc., of Chicago, Illinois, received the first two contracts (July 13, 1984, for FY 80, 81, 82, and 83 requirements and October 15, 1985, for FY 84, 85). More historical details may be found in Order 6850.27, Remote Radio Control System Project Implementation Plan, dated March 25, 1988.

c. The FY-86 and 87 budget requirement for the RRCS establishment visual aid program is for a production of 180 units. The contract was awarded to New Bedford Panoramex on August 15, 1988. Delivery for this phase of the program is projected to be completed in 1991.

d. A budget item for the Replace Visual Aid Remote Radio Control System was funded and approved for FY-88 for another large quantity of additional RRCS's.

e. Implementation of the RRCS under these contracts is to continue through December 31, 1992.

23.-29. RESERVED.

# CHAPTER 3. PROJECT DESCRIPTION

## 30. FUNCTIONAL DESCRIPTION.

a. The RRCS program is the implementation of remote radio control for medium-intensity approach lighting system (MALS), MALS with sequence flashers (MALSF), MALSR, omnidirectional approach lighting system (ODALS), runway end identifier lights (REIL), precision approach path indicator (PAPI), and visual approach slope indicator (VASI). The RRCS consists of a switch assembly cabinet with mounting facilities for holding five switch assembly panels and an encoder unit which translates the operation of push button switches on the switch assembly panel into unique parallel data codes and a unique facility code for each push button actuated. These signals are then fed into an encoder interface unit which employs frequency shift keying (FSK) to translate the digital signals into voice frequency tones. These tones are passed to a frequency modulation (FM) transmitter, modulate the carrier, and are then received by an FM receiver installed in the proximity of a specific visual aids facility. There the received signal is demodulated and converted back to a digital signal. The signal is then passed to decoder equipment which converts the signal to the proper control signal and then transmits it to the remote radio control interface unit.

b. It should be noted that a separate interface unit as specified in FAA-E-2663, Interface Unit, MALSR Remote Control, dated November 18, 1976, must be used to interface the RRCS with each lighting subsystem. This unit converts the direct current (DC) and alternating current (AC) signals received from the decoder into 120 VAC signals to operate and control the specified lighting subsystem. Air-to-ground (A/G) control capability for visual aids is provided by interfacing the A/G receiver controller with the same interface unit.

c. Figure 3-1, Remote Radio Control System Site Configurations, and 3-2, Remote Radio Control System Tower Configuration, block diagrams show the RRCS and the visual aid facilities.

d. Figure 3-3, Switch Assembly Cabinet, is a diagram of the switch assembly cabinet with switch assembly panels installed.

FIGURE 3-1. REMOTE RADIO CONTROL SYSTEM SITE CONFIGURATIONS

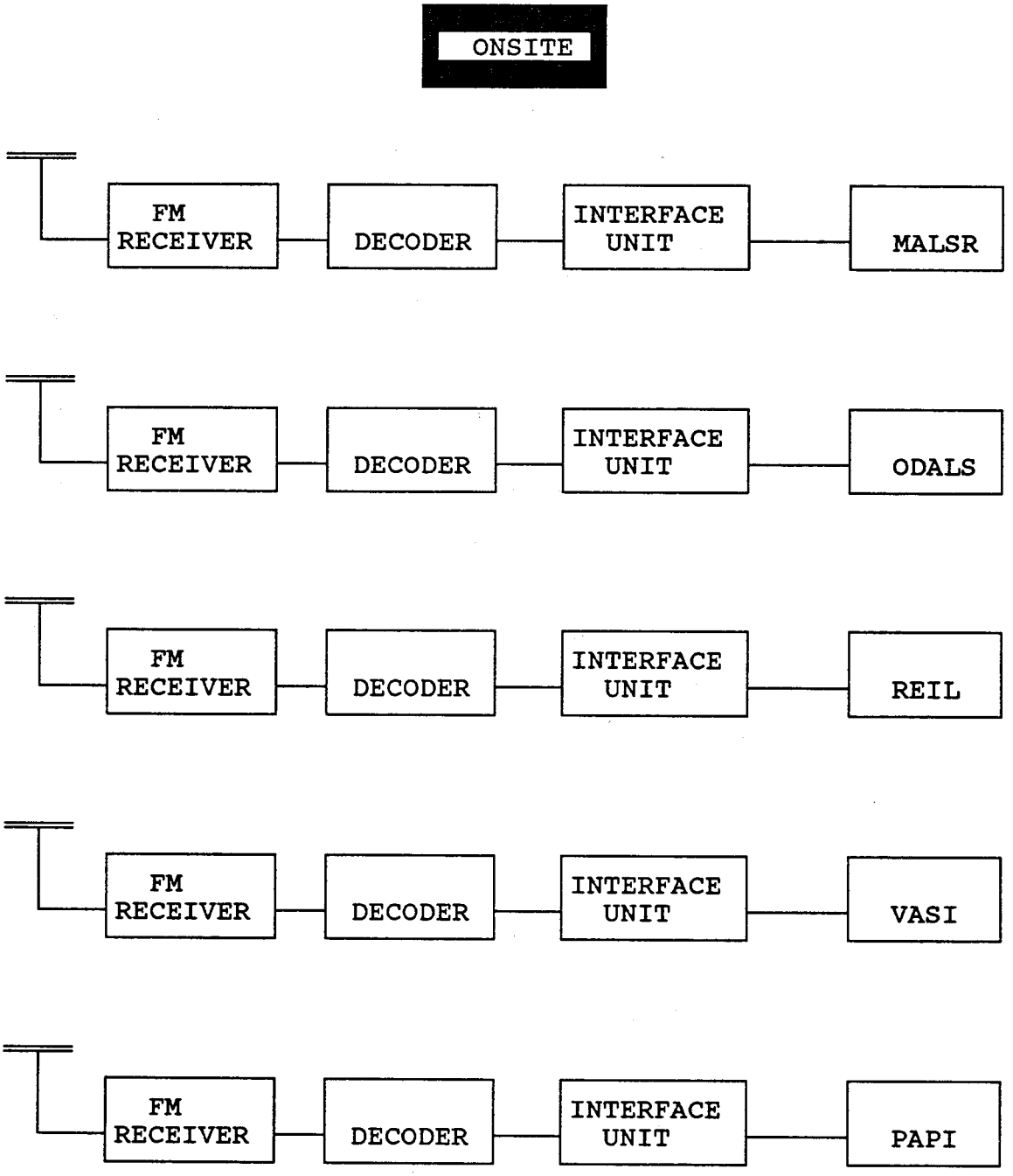


FIGURE 3-2. REMOTE RADIO CONTROL SYSTEM TOWER CONFIGURATION

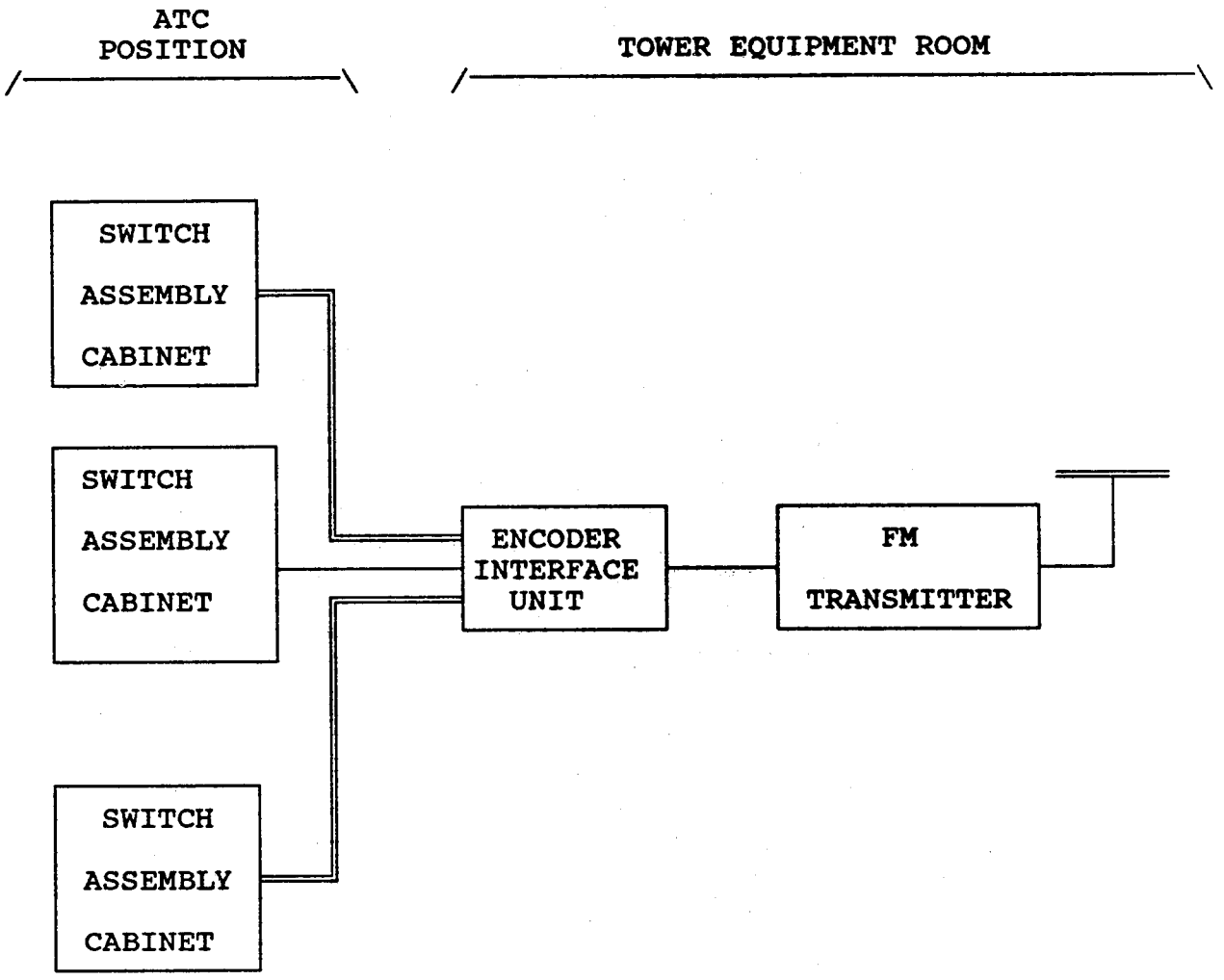


FIGURE 3-3. SWITCH ASSEMBLY CABINET

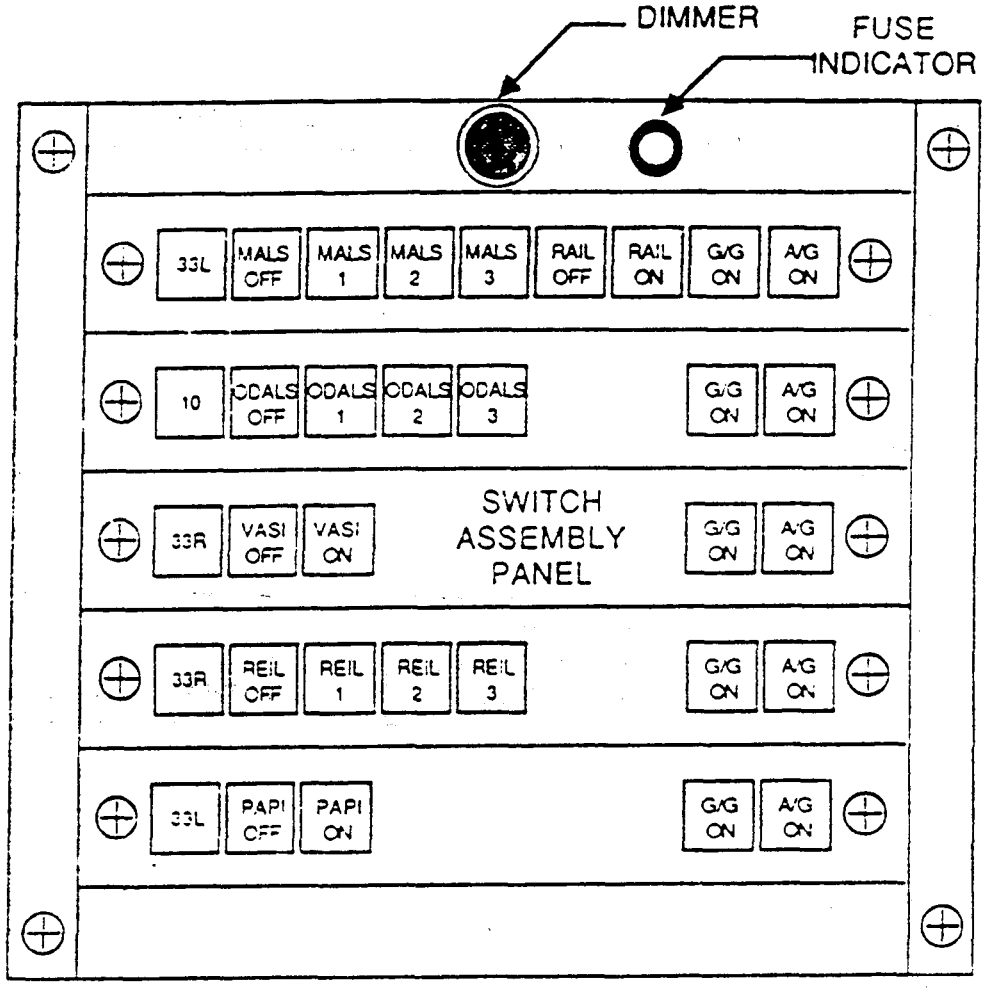



Figure shows 1 each type I, II, III and 2 each type IV switch assembly panels.

**31. PHYSICAL DESCRIPTION.**

a. Switch Assembly Cabinet. The switch assembly cabinet is located in the control facility and functions as a central point of control and operation for FAA installed lighting subsystems. The switch assembly cabinet is 9-1/2 X 10.7 X 8 inches in dimension, and houses four types of switch assembly panels, which contain push button switches for remotely operating and controlling various visual aid lighting systems. In addition to the switch assembly panels, the switch assembly cabinet houses the encoder unit, a mother board and its connector for connecting signals and power to the encoder interface unit.

(1) TYPE I. Controls the medium-intensity approach lighting system with sequenced flashing lights and medium intensity approach lighting system.

(2) TYPE II. Controls the omnidirectional approach lighting system.

(3) TYPE III. Controls the runway end identifier lights.

(4) TYPE IV. Controls the visual approach slope indicator system or the precision approach path indicator system.

b. Encoder Interface Unit. The encoder interface unit is designed to mount onto a standard 19-inch rack located in the ATCT equipment room. The interface unit accepts signals from a maximum of three switch assembly cabinets and delivers them as voice frequency signals to the FM transmitter. The discrete digital encoding of, and within each of, the switch assembly types differs from the encoding of the other types. The encoder interface unit also contains the tone generator and circuitry to turn the transmitter on during transmission and off at the conclusion of transmission.

c. FM Transmitter. The FM transmitter is installed in a standard 19-inch relay rack in the control facility equipment room. After accepting signals from the encoder interface unit, it delivers a modulated 1 to 2.5 watt FM signal to a standard quarter-wave very high frequency (VHF) whip antenna for transmission to the FM receiver.

d. FM Receiver. The FM receiver is installed in close proximity to the visual aid facility in a dust-tight, airtight, waterproof NEMA-12 cabinet equipped with a quarter-wave whip antenna. After accepting the transmitted signal, it demodulates

the signal and provides the output to the decoder unit via one of two 1-inch conduit hubs on the bottom of the cabinet.

e. Decoder. The decoder is also installed in a dust-tight, airtight, and waterproof NEMA-12 cabinet in close proximity to the visual aid facility. It has two 1-inch conduit hubs on the bottom of the cabinet for power and signal lines.

f. Radio Remote Control Interfacing Unit. The interface unit, which uses signals received from the decoder to control the visual aids, is installed between the decoder and the visual aid in an outdoor, rainproof, dust proof, non-ventilated cabinet with lightning arrestors connected to the power inputs and also to the control input leads from the A/G unit.

**32. SYSTEM REQUIREMENTS.** RRCS requirements include power, reliability, maintainability, and interchangeability. Modularity and spectrum support are also design considerations of the system.

a. Power Requirements. The RRCS equipment operates on commercial power source (120 +/- 18 VAC, 60 Hz), or from power derived by the RRCS from commercial power sources for subsystems. The system is designed to prevent a restart in a undefined state after interruption of primary power either at the lighting subsystem or control facility. The system also provides transient protection at the AC power input and control signal lines. Table 3-1, Power Requirements, contains subsystem power requirements.

b. Modularity. All electronic, electrical, and mechanical components are designed and constructed to minimize the skill, experience, and time necessary to disassemble, assemble, and maintain them. All electronic circuits are designed using plug-in printed wiring boards except where high voltage or high power devices are utilized. Similar functions are performed using identical modules wherever practical, and preference is given to designs which afford component replaceability.

c. Interchangeability. All parts of each system are interchangeable between systems, and identical parts within each system are interchangeable. In addition, the switch assembly cabinet, switch assembly panels, encoder interface unit, transmitter and antenna, receiver and antenna, and decoder shall have the same form, fit, and function as the same FAA Type FA-10047 equipment units. The system shall accept and operate, as specified in FAA-E-2723, with the individual components of the FAA Type FA-10047 system substituted for components supplied under the New Bedford Panoramex contract.

d. Maintainability. The switch assembly panels, switch assembly cabinet, encoder, encoder interface unit, and power supply as a subsystem as well as the decoder, FM transmitter, and FM receiver have an analytically determined mean time to repair (MTTR) of 15 minutes and a maximum repair time of 30 minutes.

e. Reliability. The analytically determined reliability of these subsystems, except for the transmitter and receiver, is 20,000 hours for the upper test mean time before failure (MTBF) and 10,000 hours for the lower test mean time before failure. The transmitter and receiver have a lower MTBF of 5,000 hours and an upper MTBF of 10,000 hours.

TABLE 3-1. POWER REQUIREMENTS

| EQUIPMENT | INPUT POWER | OUTPUT POWER | REMARKS |
|---|---|---|---|
| Switch Assembly Cabinet | 24VDC unregulated | 12VDC regulated | From Encoder Interface Unit Power Supply |
| Encoder Unit | 12VDC regulated | ---- | From Mother Board in the Switch Assembly Cabinet |
| Encoder Interface Unit | 120 ± 18VAC, 60Hz 12VDC | 24VDC unregulated | Unit must be no more than 500 ft away from the Switch Assembly Cabinet |
| FM Transmitter | 120 ± 18VAC, 60Hz | ---- | |
| FM Receiver | 120 ± 18VAC, 60Hz | | |
| Decoder | 120 ± 18VAC, 60Hz | | Relay Interfaces |
| Interface Unit | 120VAC, 60Hz | | |

f. Spectrum Support. The FM transmitter provides single-channel operation in the 162 to 174 MHz frequency band with a +/-8 kHz deviation of the FM carrier. Audio modulating tones in the range of 300 Hz to 3000 Hz are utilized with a modulation index equivalent to 100 percent. Unmodulated carrier output power shall be between 1.0 to 2.5 watts. Conducted spurious and harmonic emissions shall in compliance with all standards specified in chapter 5 of National Telecommunications Information Administration (NTIA) Manual of Regulations and Procedures. The transmitter and receiver meet NTIA and Federal Communications Commission (FCC) requirements for fixed base operation. All RRCS's are factory aligned to 165.7625 Mhz.

33. **INTERFACES.** At airports manned by air traffic control on less than a full-time basis, the A/G unit operates when selected by the ground-to-ground (G/G) unit allowing aircraft pilots to operate the visual aid system from the air. Interface of the A/G unit with the RRCS will be through the radio remote control interface units provided with the visual aid.

34.-39. RESERVED.

# CHAPTER 4. PROJECT SCHEDULE AND STATUS

**40. PROJECT SCHEDULE AND GENERAL STATUS.** The procurement of the RRCS equipment for FY-86/87, DTFA01-87-Y-01034, provides 180 RRCS's.

**41. MILESTONE SUMMARY SCHEDULE.** The current project schedule is shown as Table 4-1, Milestone Summary Schedule (FY 86-87). Project events are scheduled in relationship to the date of contract award. The dates listed are for those milestones completed or as anticipated from contractual requirements. This table is by no means the all inclusive list of project milestones necessary for project completion.

TABLE 4-1. MILESTONE SUMMARY SCHEDULE (FY 86/87)

| EVENT | DATE |
|---|---|
| Contract Award | 8/15/88 |
| First System Delivery to T&E site | 7/15/90 |
| First System Delivery to FAA Depot | 9/07/90 |
| Last System Delivery to FAA Depot | 4/11/91 |

**42. INTERDEPENDENCIES AND SEQUENCE.** The following projects are interdependent with the RRCS project. Because of the broad variation in site requirements, discussion of specific effects of each program on a site-by-site basis is beyond the scope of this project implementation plan.

a. The Airport Cable Loop Program. The Airport Cable Loop Program establishes a network with all of the airport's power and control cables. The RRCS will precede the Airport Cable Loop Program at some locations which might lead to their being dropped from control cable loops, although power cable loops may still be required.

b. The Airport Telecommunications Program. The Airport Telecommunications Program will establish the specifications and criteria for a reliable and flexible distribution system for low activity and medium activity airports. The Airport Telecommunications Program is related to all airport projects which require buried cable for control signals or communications between sites. The Airport Telecommunications Program investigates frequency interference and alternative communications media within the NAS Plan. The RRCS is related to this program since the RRCS does require a frequency that needs to be coordinated with the Spectrum Engineering Division, (ASM-500).

43.-49. RESERVED.

# CHAPTER 5. PROJECT MANAGEMENT

**50. PROJECT MANAGEMENT, GENERAL.** This chapter describes the organizations within the Program Director, Navigation and Landing that are directly responsible for RRCS project management.

a. Program Director for Navigation and Landing. The Program Director for Navigation and Landing manages, directs, and executes the FAA's engineering and management activities related to facilities design, air navigation, landing aids, and air traffic control facilities and equipment to ensure that the NAS is efficient, economical, and responsive to operational needs.

b. Program Management Engineering Division (ANN-100). This division is the principal element of the service responsible for the design, development, and implementation of systems, programs and facility requirements for navigation and landing systems.

c. Visual Aids Engineering Branch (ANN-140). The Visual Aids Engineering Branch is the principal element of the division responsible for design, development, and implementation responsibilities for approach lighting systems and visual range aids.

d. Remote Radio Control System Program Manager. The RRCS Program Manager is supported by a technical staff and is responsible for managing the design, development, and implementation activities associated with the RRCS. These duties include:

(1) Management. Planning, scheduling, and managing the program from design through commissioning, logistics support, training, and program completion. Responsible for systems engineering, system design, man-machine interface, component design and related functional, technical, and performance characteristics. Acts as chairman of the National Airspace Integrated Logistics Support Management Team (NAILSMT).

(2) Equipment and Spares Provisioning. Provides, in conjunction with the Logistics Service and Systems Maintenance Service, technical guidance to define logistics support for proper provisioning of equipment.

(3) Modernization Input. Developing service input for the modernization or in-service improvement of equipment.

(4) Technical Officer. Providing engineering advice and consultation to the contracting officer during procurement and reviewing contractor requests and progress payments.

(5) Cost Data. Developing and providing cost data, controlling assigned funds, and adjusting program schedules and objectives as necessary.

(6) Technical Installation Instructions. Preparing technical installation instructions.

(7) Maintenance Instructions. Preparing maintenance instructions, identifying training, provisioning and test requirements, and directing the preparation of maintenance technical handbooks.

(8) Testing. Reviews and approves manufacturers' equipment test procedures. Establishes requirements and approves plans for test and evaluation of engineering activities of the FAA Technical Center.

(9) Inventory. Manages in-transit material for construction and installation. Maintains currency of material systems and control over equipment inventory.

(10) Installation. Management of installation activities for current and future systems to assure a high level of system performance.

(11) Acceptance. Providing research, engineering, development, design and systems analyses associated with acquisition and acceptance of hardware and software.

**51. PROJECT CONTACTS.** This paragraph lists RRCS project contacts and their addresses.

a. RRCS Program Director. Rodman Gill, ANN-1, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C., 20591, FTS 267-6531, (202) 267-6531.

b. RRCS Program Manager. Charles B. Ochoa, ANN-140, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C., 20591, FTS 267-6600, (202) 267-6600.

c. RRCS Project Engineer. Clesson McDonald, ANN-140, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C., 20591, FTS 267-6580, (202) 267-6580.

**52. PROJECT COORDINATION.** The RRCS project requires coordination with other services within the FAA and with regional representatives. Coordination by and with the following organizations is essential for them to efficiently accomplish their functions.

a. Maintenance Engineering Division (ASM-100). ASM-100 reviews procurement specifications to ensure the design meets the reliability and maintainability requirements and supports the general maintenance philosophy. ASM-100 also coordinates the development of an integrated logistic support plan for the RRCS acquisition and develops maintenance standards and plans for implementation of maintenance concepts. ASM-100 assures that test equipment for existing or other than new establishment projects is provided.

b. Maintenance Operations Division (ASM-200). ASM-200 participates in the development and review of maintenance plans. In addition, ASM-200 develops national Airways Facilities sector staffing standards for the RRCS program and validates maintenance staffing requirements and personnel certification. The program manager ensures the project is in conformance with staffing, training, certification policies, guidelines, and requirements.

c. Spectrum Engineering Division (ASM-500). ASM-500 obtains frequency authorizations necessary to satisfy the requirements of the National Airspace System. This division also provides engineering support to regional and field facilities in the resolution of and prevention of radiofrequency interference to NAS facilities.

d. National Engineering Field Support Division (ASM-600). ASM-600 provides support in the development of test plans and producers for site-specific requirements. ASM-600 will conduct all testing and analyze the results of the tests and recommend actions needed to correct deficiencies.

e. NAS Support Division (ALG-200). ALG-200 develops, recommends, and issues agency systems, procedures, standards, and policies for material, supply, and property management. This division also develops the required logistics policies, plans, and standards required to support the NAILS process.

f. Contracts Division (ALG-300). ALG-300 performs cost/price analyses of contractor's proposals and participates as a member of the Source Evaluation Board on RRCS procurements subject to the contracting officer. In addition, ALG-300 provides procurement support for the RRCS program and plans, and places and administers contracts for the RRCS equipment.

ALG-300 also designates a contracting officer (CO) who is responsible for all contractual matters. The CO is the only individual authorized to approve contract changes impacting price, delivery, or schedule.

f. Industrial Division (ALG-400). ALG-400 performs factory inspection of the RRCS. ALG-400 assigns a quality reliability officer (QRO) at the time the contract is awarded. The QRO is the FAA's representative at the contractor's facility and is responsible for verifying quality control. The QRO is directed by FAA policy and procedure and by the terms and conditions of the contract.

g. Grants-in-Aid Division (APP-500). APP-500 directs the airport grant program and should be included in the coordination process to avoid conflicts which may arise because of pending airport project, including those where the airport may be purchasing its own RRCS under the grant program.

h. FAA Depot (AAC-400). AAC-400 manages the dissemination of working equipment for the RRCS sites at the regions request. The FAA Depot provides repair of unserviceable repairable items requiring specialized repair procedures, test equipment tools, diagnostic hardware/software, and major shop facilities. Provides all other FAA Depot functions as set forth in the NAILS Master Plan.

i. FAA Academy (AAC-900). AAC-900 evaluates and monitors the development and conduction of contractor training and provides maintenance training after completion of contractor training. AAC-900 will participate in workshops and meetings related to program implementation and the deployment readiness review (DRR) process.

j. Airway Facilities (AF) Training Program Division (AHT-400). AHT-400 analyzes training proposals prepared by ASM-200 and initiates action to meet training requirements.

k. FAA Aviation Standards National Field Office. The FAA Aviation Standards National Field Office is responsible for providing the coordination to accomplish the following functions:

(1) Provides the support necessary for accomplishing the preliminary (preparatory) and commissioning flight inspections, as required.

(2) Determines if the operational status of a facility or system is in accordance with the established tolerances.

(3) Certifies the facility or system for operational use in the NAS when all operational requirements have been met.

(4) When applicable, ensures that required Notices to Airmen (NOTAMS) are issued for any facility or system restriction.

l. Flight Standards Service Planning and Program Management Branch (AFS-12). AFS-12 manages the prioritization and validation of facilities and equipment requirements for the RRCS.

m. FAA Regional Offices. The FAA regional offices through established administrative structures coordinate with all responsible parties to assure adequate funding, establish system commissioning/service availability dates, assign project field representatives, and determine utility availability for the RRCS. The regions also provide field engineering as required to support preparations for the installation of the RRCS. Orders Government Furnished Materials (GFM), tools and test equipment to support installation and acceptance; tailor installation drawings to be site specific; initiate work orders and travel authorization; and assign field personnel. The installation of the RRCS will be accomplished by regional personnel. The region will purchase equipment shelters with lightning protection if required for new locations. The following regional offices are responsible for the coordination required to accomplish the functions listed as follows:

(1) Regional Airway Facilities Division.

(a) Installing facilities systems and equipment in accordance with established standards, specifications, and instructions.

(b) Notifying the appropriate sector that a project has been funded and issuing a projected implementation schedule.

(c) Providing the sector an opportunity to review and participate in project plans during the engineering phase and for furnishing the sector a copy of the engineering plans and contract documents.

(d) Providing the sector a copy of the project work order at least 10 days before the start of project work.

(e) Providing the appropriate facility reference data file (FRDF) information to the sector for inclusion in the FRDF.

(f) Providing the essential facility, system, and equipment technical reference and performance parameters as part of the project transmittal when maintenance technical handbook parameters are not available.

(g) Ensuring that all modifications, Configuration Control Documents (CCD), manufacturer's field changes, and factory changes are current and documented for equipment received from sources outside the Airway Facilities sector.

(h) Notifying the joint acceptance board chairman of when the facility will be ready for Joint Acceptance Inspection (JAI), providing the sector all data necessary to prepare warranty failure reports on items failing prior to JAI, and providing regional Airway Facilities division representatives for participation in the JAI.

(i) Establishing and maintaining a follow-up file for monitoring and clearing all JAI report exceptions, reviewing all JAI reports and follow-up reports for correctness, completeness and proper distribution, taking appropriate and timely actions to clear JAI report exceptions, and identifying additional sources of funds or initiating budgetary action, as necessary, to clear exceptions.

(j) Establish in conjunction with flight standard procedures personnel, a realistic commissioning chart date, flight inspection and any corresponding NOTAMS.

(k) Notifying the regional Airports Division of the intent to establish an RRCS at an airport and to coordinate with the division to avoid any conflict with actual or proposed airport development at that airport.

(2) Airway Facilities Sector.

(a) Reviewing contract documents and engineering plans during the engineering phase and providing comments to the regional Airway Facilities division.

(b) Providing personnel as required at appropriate times throughout the project to witness and/or participate in construction, installation, tune-up, tests, and collection of technical reference data.

(c) Coordinating the release of equipment currently in use to regional Airway Facilities division establishment personnel for use in the project.

(d) Properly maintaining those components of an existing facility which are unaffected by an improvement project.

(e) Ensuring that modification/CCD's and documentation are current on installed equipment for the purpose for which the equipment was being used prior to the project.

(f) Providing a representative to serve as the joint acceptance board chairperson and other qualified personnel for participation in the JAI, preparing and distributing the JAI report, and assuming maintenance responsibilities and custodianship for facilities, systems, or equipment at the conclusion of JAI.

(g) Coordination and follow-up on exceptions after the JAI to include exceptions assigned to other organizations or to a contractor for clearance, clearing exceptions which have been assigned to the sector, reporting the clearance of exceptions, and reviewing all waived exceptions to determine if actions will impact sector operations or other organizations.

(h) Maintaining all equipment warranty information and reporting equipment failing under warranty.

(i) Receiving, storing, and shipping project materials and disposing of excess equipment and materials.

(j) Participate in all phases of commissioning and initiate the official notification of commissioning.

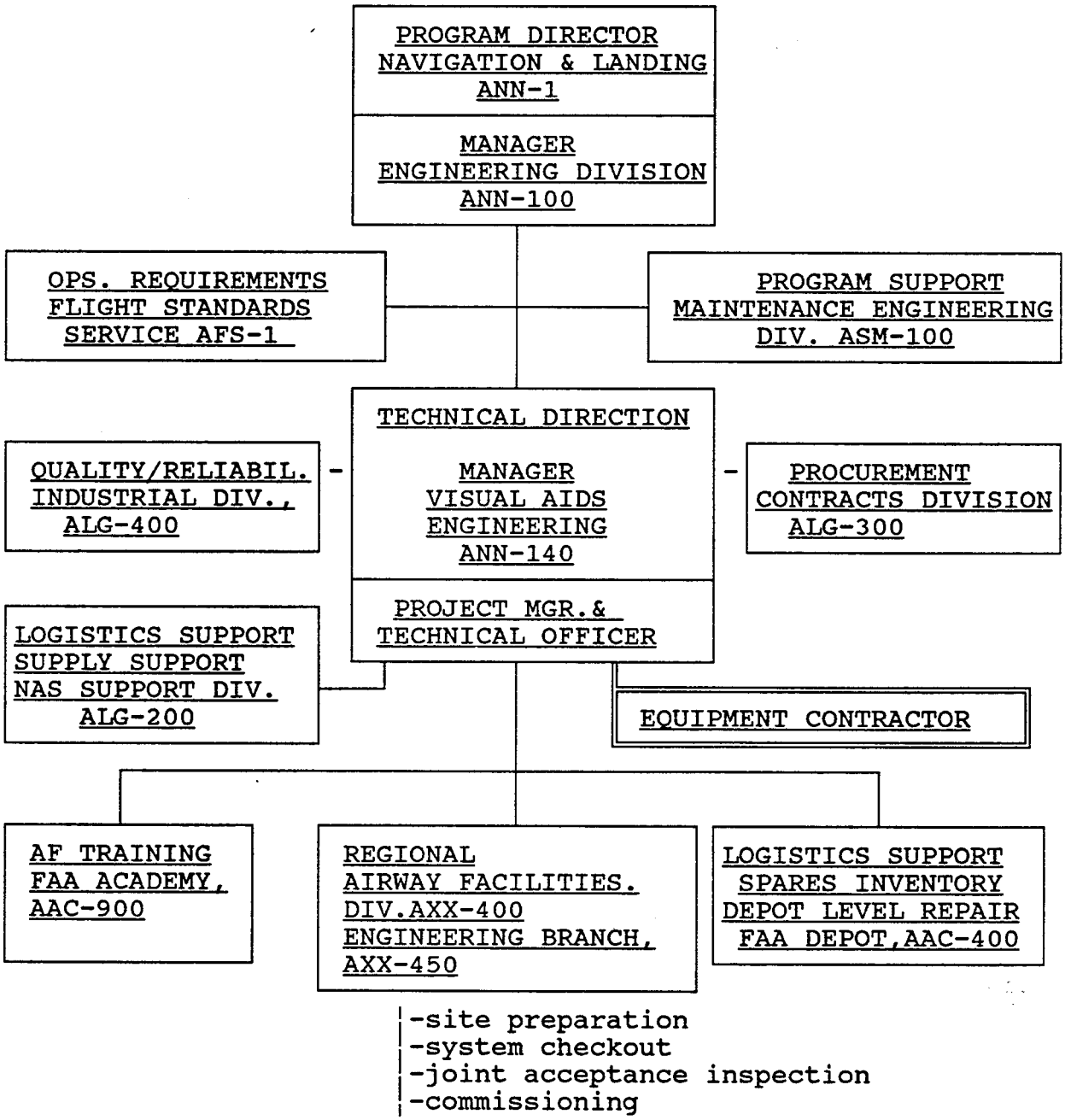
(3) Regional Logistics Division. Provide representatives to participate in specific projects which the regional Airway Facilities division has identified as having major logistical problems and has requested the participation by the regional Logistics division.

(4) Regional Flight Standards Division. Provide technical expertise to the regional Airway Facilities division, as required, for accomplishing JAI's and the commissioning of facilities and systems.

n. Contractor. The equipment manufacturer, when requested by ANN-140, provides engineering support services for onsite advice, including technical supervision to FAA technicians and the installation contractor concerning proper installation, maintenance, and operation of the RRCS.

**53. PROJECT RESPONSIBILITY MATRIX.** Figure 5-1, Project Responsibility Matrix, illustrates the FAA organizations responsible for the implementation of each significant function of the RRCS project.

FIGURE 5-1. PROJECT RESPONSIBILITY MATRIX



**54. PROJECT MANAGERIAL COMMUNICATIONS.** The RRCS project manager within ANN-140 is the focal point for all internal project communication. Organizations supporting the RRCS project designate a representative to maintain close communication with the Visual Aids Program Office. Supporting organizations maintain communications within the FAA but never directly with the contractor without the contracting officer's permission. The following meetings listed are the regularly scheduled project meetings or conferences.

a. The National Airspace Integrated Logistics Support Conference. These conferences are held to ensure that there is an interrelated, unified and iterative approach to the managerial and technical activities which support the NAS. During these conferences issues effecting logistics management, maintenance planning, supply support, test and support equipment, manpower and training support, support facilities, technical data, and packing, handling, storage and transportation are discussed and resolved. These meetings can be held at the FAA headquarters, FAA Depot or contractor facility on an annual basis. Guidance can be found in the FAA NAILS Master Plan and Order 4560.1B, Policies and Procedures Covering the Provisioning Process During the Acquisition of FAA Material.

b. Program/Project Status Review Boards. These boards are held on a monthly basis at the FAA headquarters to discuss project status and to resolve problems and issues effecting all phases of the project from the time that the requirements are established until system deployment has been completed.

**55. IMPLEMENTATION STAFFING.** There are no personnel requirements peculiar to the implementation phase of the project.

**56. PLANNING AND REPORTS.** None required.

**57. APPLICABLE DOCUMENTS.** Within this RRCS PIP the following documents have been referenced:

a. Contract DTFA01-87-Y-01034, for Remote Radio Control Systems, August 15, 1988.

b. FAA Specification, FAA-E-2723, Remote Radio Control System, December 21, 1982.

c. FAA Specification, FAA-E-2663, Interface Unit, MALSR Remote Control, November 18, 1976.

d. FAA-G-1201d, Provisioning Technical Documentation,

e. FAA-G-1375b Spare Parts-Peculiar for Electronic, Electrical and Mechanical Equipment,

f. FAA-STD-019A, Lightning Protection Grounding, Bonding and Shielding Requirements for Facilities.

g. FAA-STD-036, Preparation of Project Implementation Plans, date.

h. Order 1810.4A, FAA NAS Test and Evaluation Program, February 14, 1989.

i. Order 1800.8E, NAS Configuration Management, July 11, 1985.

j. Order 3400.3E, Airway Facilities Maintenance Certification Program, August 4, 1978.

k. Order 4560.1B, Policies and Procedures Covering the Provisioning Process During the Acquisition of FAA Materiel, March 10, 1989.

l. Order 6000.15A, General Maintenance Handbook for Airway Facilities October 26, 1988.

m. Order 6000.26A, Reliability and Maintainability Policy, May 14, 1982.

n. Order 6030.45, Facility Reference Data File, February 11, 1987.

o. Order 6200.4D, Test Equipment Management Handbook, September 16, 1985.

p. Order 6850.2A, Visual Guidance Lighting Systems, December 17, 1981.

q. Order 6850.5A, Maintenance of Lighted Navigational Aids, May 1981.

r. Order 6950.2C, Electrical Power Policy Implementation National Airspace System Facilities, November 1987.

s. Order 6850.27, Remote Radio Control System Project Implementation Plan, March 25, 1989.

t. Order 6650.6B, Maintenance of Radio Control Equipment for Plant Facilities, May 1984.

u. National Airspace System Plan, Facilities, Equipment, Associated Development and Other Capital Needs, April 1987.

v. NAS-MD-110, Test and Evaluation (T&E) Terms and Definitions for the National Airspace System, March 27, 1987.

w. NAS-MD-790, Remote Maintenance Monitoring Interface Control Document.

x. FAA National Airspace Integrated Logistic Support Master Plan, March 1987.

y. National Telecommunications Information Administration Manual, Regulations and Procedures for Federal Radio Frequency Management.

58.-59. RESERVED.

# CHAPTER 6. PROJECT FUNDING

**60. PROJECT FUNDING STATUS, GENERAL.** The RRCS is funded under the RRCS replacement program and under individual facility establishment projects. The RRCS covered by this PIP is funded as part of the individual visual aid establishment projects. The funds for the individual sites have been distributed to the regions and headquarters for each site. Establish and replacement projects have been funded through FY-88. As funds are made available though the budget process all visual aid RRCS's will be replaced.

61.-69. RESERVED.

# CHAPTER 7. DEPLOYMENT

**70. GENERAL DEPLOYMENT ASPECTS.** Deployment of RRCS equipment is conducted by the FAA Depot at the Mike Monroney Aeronautical Center and the FAA regions upon approval from FAA headquarters. As RRCS equipment becomes available, requests from the regions to satisfy RRCS requirements are honored by the FAA Depot. RRCS equipment is shipped by the FAA Depot to the site where it is stored for installation. Installation of the RRCS is the responsibility of the requesting FAA region. Table 7-1, RRCS (FY 86/87) DRR Schedule, depicts the DRR Schedule.

TABLE 7-1. RRCS (FY 86/87) DRR SCHEDULE

| EVENT | DATE |
|---|---|
| Delivery to T&E Site | 7/15/90 |
| Shakedown Testing Complete | 8/07/90 |
| Final Report to Associate Administrator | 8/14/90 |
| Excom Mtg | 8/28/90 |

**71. SITE PREPARATION.** The regions are responsible for preparing the sites where RRCS equipment is to be located. The preparation at each site will be unique according to the type of implementation occurring. Implementation schemes consist of establishing systems at new locations. At locations where there is an existing ground-to-ground RRCS, there will be two separate G/G radio control systems after the RRCS is installed. The existing ground-to-ground radio control system will be removed under the RRCS Retrofit Program when funding becomes available. The RRCS shall be installed in accordance with the standard drawings provided for each visual aid facility. Additionally, regions will have to request from the FAA Depot the necessary number of interface control units per FAA-E-2663 for each lighting subsystem which will be controlled by the RRCS. Every effort is being made within the constraints of budget approvals to reduce the necessity of having two systems operating in parallel.

**72. DELIVERY.** The RRCS will be delivered to the FAA Depot in accordance with Table 4-1, Milestone Summary Schedule. RRCS equipment will be available to the regions under the constraints of fiscal year funding. The FAA Depot ships equipment to the regions as requests are made and in accordance with the quantities called out in the project status report (PSR). Implementation of the project is scheduled to be completed in December 1992.

**73. INSTALLATION PLAN.** FAA regional engineering offices are responsible for the installation of RRCS equipment. The RRCS equipment will be installed in accordance with national standard drawings and standards revised to fit the individual site. Installation procedures will be executed in accordance with the instruction books provided with the RRCS equipment.

**74. CONFIGURATION MANAGEMENT PLAN.** Configuration Management (CM) is the process used to identify and document the functional and physical characteristics of a configuration item, control changes to those characteristics, and record and report change processing and implementation status. Configuration items of concern for this implementation are the switch assembly cabinet, encoding and radio transmission equipment, receiver equipment, decoding equipment, and remote radio control equipment hardware baselines. The CM discipline shall be applied to all configuration items included in the RRCS baselines to ensure compatibility between elements within the RRCS. All additions and changes to the RRCS baselines shall be proposed in the form of a case file and shall be reviewed for recommended approval or disapproval by a Configuration Control Board (CCB). All changes to the NAS site design baseline and interfaces between the RRCS and the visual aid system must be processed and approved by the Navigation and Landing (ANN-100) CCB.

a. Acquisition Phase Configuration Management.

(1) The ANN-100 CCB controls the establishment of and changes to the RRCS hardware baselines during the acquisition phase. For RRCS matters, the CCB will include members from NAS System Engineering, ASM-600, ACN-210, ASM-500, and AFS-200. The CCB is responsible for ensuring that the functional, performance, and interface requirements allocated to the RRCS hardware subsystems are reflected in the baselines, and in any changes to those baselines until product acceptance. The CCB is also responsible for ensuring that baseline documentation is accurate and reflects RRCS operational requirements. Baseline documentation includes specifications and interface control documents (ICD). The CCB retains this CM responsibility until the hardware installation is commissioned at each site.

(2) The transition of CM responsibilities associated with RRCS hardware products occurs at acceptance by the ANN-100 CCB designated representative of the contractor's delivered, installed, integrated, and tested hardware product. Hardware product acceptance is based on successful operational readiness demonstration (ORD) of workstation transmission, encoding, and decoding capability of the equipment.

(3) At product acceptance, the change control functions and CCB records associated with hardware products transition from the ANN-100 CCB to the Maintenance Engineering (ASM-100) CCB.

b. Operational Support Phase CM.

(1) During the operational support phase, and for the entire life-cycle of the implemented hardware enhancements, CM functions will consist of maintenance and change control management of site (Level III Design) as well as product baseline.

(2) The ASM-100 CCB assumes baseline and change control management of the switch assembly cabinet, encoding and radio transmission equipment, receiver equipment, decoding equipment, and remote control radio equipment hardware products and associated peripherals as each product is commissioned for operational service via Memorandum of Agreement (MOA) and of related NAS site design baselines (including logistics and training). The ASM-100 CCB is responsible for change control management of the RRCS hardware product baseline by MOA. Hardware product baselines are maintained by the National Airway Engineering Field Support Division personnel for the field. The contractor shall provide engineering changes to ASM-600 when the changes are released, and prior to field implementation. ASM-600 shall evaluate the changes and approve the change for field implementation via case file. The CM functions assigned to the ASM-100 CCB are described in the ASM-100 CCB charter.

75.-79. RESERVED.

# CHAPTER 8. VERIFICATION

**80. FACTORY VERIFICATION.** The RRCS equipment contractor performs design qualification and production unit tests using a complete RRCS as depicted in Figure 8-1, Operational Test Set-Up, to validate and demonstrate that the RRCS meets the specification requirements of FAA-E-2723.

a. Design Qualification Tests. The contractor conducts design qualification tests to demonstrate that the RRCS system meets every specification requirement through inspection, analysis or actual qualitative or quantitative tests. These tests include equipment visual inspections, environmental tests, systems and spare parts tests, transient suppression tests, interference tests, interchangeability tests, and the specified tests for the transmitter, receiver, and antenna.

b. Production Unit Tests. Production unit tests for the RRCS include visual inspections, functional tests, and timed systems tests for every production unit. Any erratic switching, loss of control or operation outside prescribed limits is cause for rejection of the unit.

**81. CHECKOUT.** After installation of equipment by the regions, FAA personnel conduct checkout tests in accordance with the contractor developed equipment instruction books. The procedures followed include testing electrical and mechanical hardware interfaces and verifying system performance and operation of spare parts.

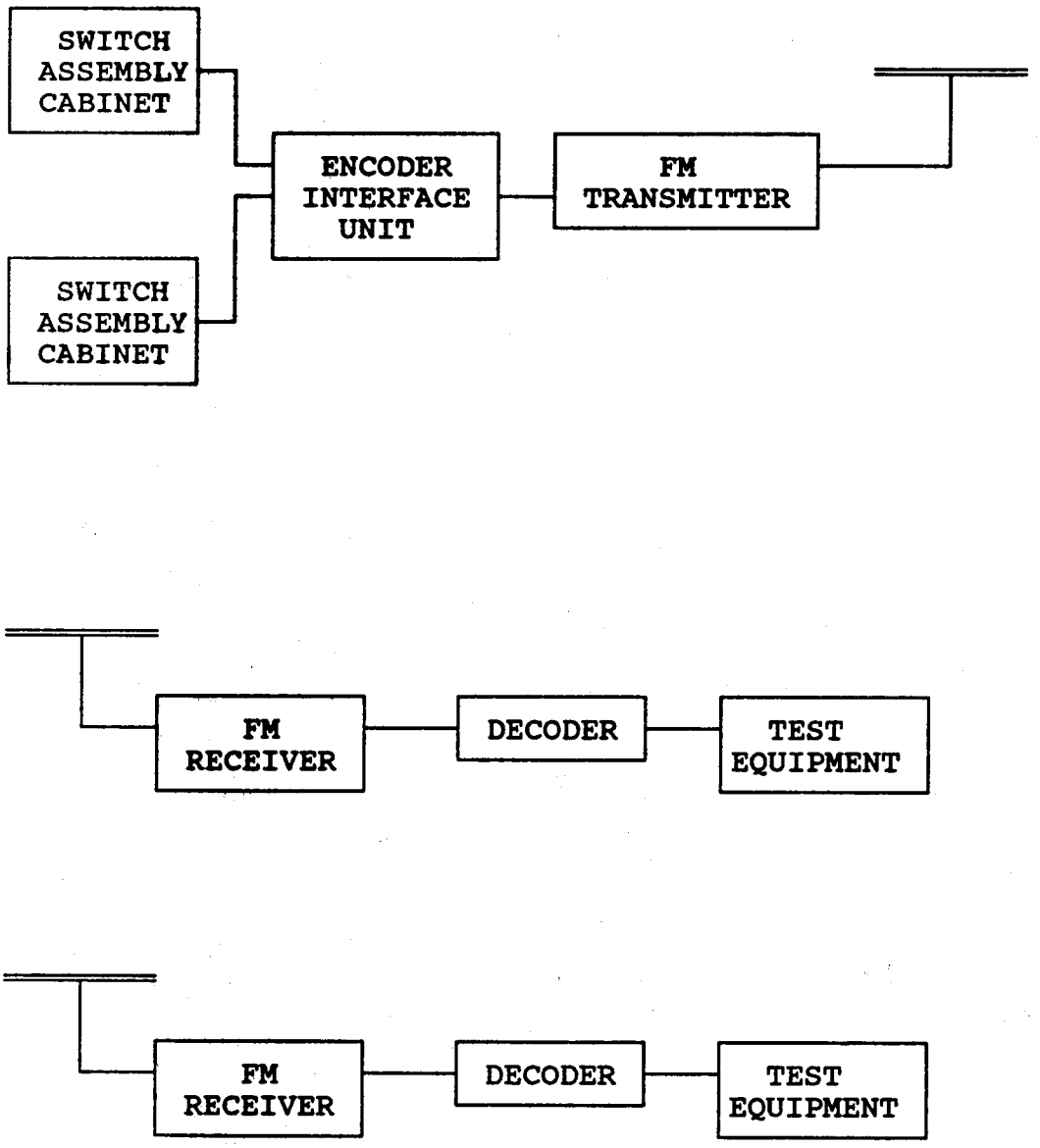
**82. CONTRACTOR INTEGRATION TESTING.** Not applicable.

**83. CONTRACTOR ACCEPTANCE INSPECTION (CAI).** Not applicable.

**84. FAA INTEGRATION TESTING.** These tests are conducted to verify that the RRCS has been integrated as specified and that it can interface with the specified external systems. Included are tests that verify the operation of multiple interfaces and integration with other systems in the operational environment. At this point in time, the RRCS should have been adapted to parameters of the operational equipment with which it must interface.

**85. SHAKEDOWN AND CHANGEOVER.** Shakedown testing is performed by FAA regional personnel at the RRCS site to determine that the RRCS is ready for full operation as part of the NAS. After the successful completion of JAI, and commissioning, the local AF maintenance representative assumes responsibility.

**FIGURE 8-1. OPERATIONAL TEST SET-UP**



**86. JOINT ACCEPTANCE INSPECTION.** A joint acceptance inspection is conducted in accordance with Order 6030.45, Facility Reference Data File, to gain the consensus of involved office that the RRCS project has been completed in accordance with applicable standards and specifications and that the facilities are capable of providing the services required within established standards and tolerances. The JAI ensures compliance with requirements in the following areas:

a. Facility Construction and Equipment Installation.

b. Facility/System/Equipment Performance.

c. Facility Technical Performance Documentation and Maintenance Reference Data.

d. Trained technicians.

e. Facility Logistics Support.

f. Final Acceptance and Commissioning.

87.-89. RESERVED.

## CHAPTER 9. INTEGRATED LOGISTICS SUPPORT

**90. MAINTENANCE CONCEPT.** The RRCS is supported by both site and FAA Depot maintenance. The FAA is responsible for the maintenance of RRCS equipment. FAA regions assign personnel to AF sectors where work centers, defined by geographic and personnel skill capabilities, are responsible for the onsite maintenance of RRCS facilities.

a. Site Maintenance. Site maintenance technicians (either FAA and/or contractor) will replace RRCS components down to the line replaceable units (LRU) and may perform limited repair/corrective and preventive maintenance functions as required, onsite.

b. FAA Depot Maintenance. FAA Depot maintenance will consist of receipt and repair/replacement of failed LRU's. These functions can be performed by either the FAA and/or a commercial contractor.

**91. TRAINING.** The training program for the RRCS project is outlined in the RRCS Subsystem Training Plan (STP). Assignment of training quotas for the regions will be made by ASM-260 for Airway Facilities personnel. Projected training requirements for individual work centers/facilities and principle training milestones are included in this training plan. Training for the first five classes under the New Bedford Panoramex contract will be conducted by the contractor at their facilities. Previous RRCS buys required no contractor training. A user guide will be provided for the benefit of air traffic personnel.

**92. SUPPORT TOOLS AND TEST EQUIPMENT.** All supply support, spare parts-peculiar and RRCS system equipment, will be stored at the FAA Depot. The contractor is required to provide a quantity of parts-peculiar as defined in FAA-G-1375b. Provisioning requirements for the RRCS are developed, by the contractor, in accordance with FAA-G-1210d. Further details on supply support planning may be found in the NAILS Plan for the RRCS.

**93. SUPPLY SUPPORT.** The FAA Depot, in conjunction with ALG-200 will develop a coding structure compatible with the national stock number system to be used to catalog system components, LRU's, and expendable parts and supplies. In addition, the FAA Depot will provide supply support; additionally, site level spares will be delivered with each RRCS. The RRCS equipment procured previously is not identical to this procurement, however the LRU's are interchangeable.

**94. VENDOR DATA AND TECHNICAL MANUALS.** Instruction books for the RRCS are provided by the contractor and reviewed by the FAA prior to acceptance. Two instruction books are provided with each RRCS delivered. Other technical documentation to be provided by the contractor include provisioning technical documentation, master patterns, test equipment and characteristic data, tool list, program data for read only memory (ROM)/programmable read only memory (PROM), and reprocurement data package drawings.

**95. EQUIPMENT REMOVAL.** At locations where a new visual aid is being established and there is an existing Motorola 504 G/G radio control system, there will be two separate G/G radio control systems after the RRCS is installed. The existing Motorola 504 G/G radio control system will be removed under the RRCS Replacement Program. Surplus RRCS equipment shall be disposed in accordance with agency orders and guidelines.

**96. FACILITIES.** Not applicable.

**97. EQUIPMENT NOT FURNISHED.** Not applicable.

**98. PERSONNEL CERTIFICATION.** Personnel maintaining this equipment shall require certification in accordance with Order 3400.3E, Airway Facilities Maintenance Certification Program. Implementing the RRCS will require issuance of interim certification until a mandatory date has been issued.

**99. EQUIPMENT CERTIFICATION.** Equipment certification for the RRCS shall be in accordance with Orders 6850.5A, Maintenance of Lighted Navigational Aids, and 6000.15A, General Maintenance Handbook for Airway Facilities.